STANDARD 5 – WATER QUALITY

Water quality meets state standards.

1) Characterization:

In 1972, the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act, was signed into law. Its purpose is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The Act gave the Environmental Protection Agency the authority to implement pollution control programs through partnerships with each individual state. Provisions for establishing water quality standards were included in the Clean Water Act, as amended, and in the Wyoming Environmental Quality Act, as amended. Regulations are found in Part 40 of the Code of Federal Regulations and in Wyoming's Water Quality Rules and Regulations. The latter regulations contain Quality Standards for Wyoming Surface Waters.

The State of Wyoming has surface water quality standards in place for streams rated from class 1 to 4. Each rating class has specific numeric and narrative water quality standards. Class 1 waters of the State are waters where no additional water quality degradation will be allowed. Classes 2 through 4 waters are differentiated based on their ability to support aquatic life, fish and other human and wildlife uses. In general, Class 2 waters support fish populations, Class 3 waters are non-game fisheries protected for aquatic life, and Class 4 waters do not have the potential to support fish and maintain few areas that support aquatic life.

An additional classification scheme describes the multiple goals of a water body, for example supporting both drinking water and game fish (Class 2AB). The "A" refers to the ability to support drinking water and the "B" refers to its ability to support aquatic life. For example, a 3B classification would be non-game protected for aquatic life, but does not have the potential for drinking water.

The North Platte River is mostly designated Class 2AB due to the fisheries on the river and municipal drinking water sources in the basin and downstream. The Miracle Mile below Kortes Dam to Pathfinder Reservoir is Class 1 waters since this reach is designated a blue ribbon trout fishery. Seminoe and Pathfinder reservoirs also have the 2AB designation.

The Great Divide Basin is mostly designated Class 3B waters. The state of Wyoming is doing a Use Suitability Analysis on Red Creek to designate it as Class 4; the analysis must show that wetland/riparian areas are rare and not characteristic of the system. Most ephemeral systems in the basin will probably be reclassified as Class 4 waters, but each reach will have to have an individual analysis done before re-classification.

Water bodies that do not meet their designated beneficial uses are placed on the State 303(d) list for factors identified that contribute to the impairment. There are no water bodies on the State 303 (d) list in the analysis area.

2) Issues and Key Questions:

Non-point source impacts to water quality are the result of not maintaining healthy upland habitats and riparian/wetland systems. These impacts can result from surface disturbance, increased road density, and overuse by livestock, wild horses, and/or wildlife. Surface

disturbance and increased road density can result in erosion by altering the surface hydrology. Overuse of upland vegetation can result in increased eolian and fluvial erosion by reducing ground cover and exposing soil to erosional processes. Overuse of water sources in or near riparian/wetland areas can cause reductions in wetland vegetation from grazing and hoof action and in some cases a lowering of the water table.

Point source impacts include the potential for toxic spills along the I-80 corridor and other highway systems, industrial and municipal discharges and produced water or wastes from the oil and gas developments. Coalbed methane development in the resource area will include surface discharges in isolated portions of the Great Divide Basin including near Cyclone Rim and Separation Creek and in the North Platte by Seminoe Road (picture 109-1). In general this produced water has a higher salinity than background water quality and may contain trace metals that could evapoconcentrate in some cases.

3) Current Conditions:

In general the water quality is excellent in the North Platte watershed and poor in the Great Divide Basin. The excellent water quality in the North Platte is evident by the water quality classifications described in the characterization section. In most cases, water quality classifications are based on the beneficial uses the quality of the water can support. Some areas in both the North Platte River and the Great Divide Basins have naturally saline soils and contribute to high Total Dissolved Solids (TDS), locations where soils with high erosion potential predominate and there are localized impacts from erosion due to road construction and livestock grazing that contribute to sediment loads. The water quality is poor in the Great Divide Basin based mostly on the ephemeral nature of the surface water systems in this area. This is also evident by the water classification of Class 3 or 4 for most of the water bodies. Ephemeral systems generally flow only in response to precipitation events and therefore have typically high sediment loads when flowing, and since there are many areas with saline soils TDS values are generally high in this area. The USGS has collected water samples from stations located on the Sweetwater and North Platte Rivers and represents current water quality conditions. Very little water quality data is available for the Great Divide Basin, however there is some data available for Separation Creek that is characteristic of this area.

Sweetwater River Basin

The USGS Gage on the Sweetwater River near Alcova, Wyoming contains the most extensive water quality sampling (picture 109-2). For the Sweetwater the only parameters that exceeded standards are Iron on 4/5/78 and Turbidity on 5/6/81. Without a more detailed study it is difficult to say whether these values are anomalies or if they reflect true water quality conditions. Iron will typically be high in the first snow runoff event of the year as the system flushes through accumulated litter. The high Iron value on 4/5/78 corresponds a record snowfall year with cold temperatures.

North Platte River Basin

The excellent water quality in the North Platte River is evident by the water quality classifications described in the characterization section. In most cases, water quality classifications are based on the beneficial uses the quality of the water can support. However, the North Platte River has exceeded state standards for Turbidity. Since these high values do not seem to correlate with high flows or time of the year, it is more likely to come from side tributaries like Sage Creek,

which are dominated by shale soils and low vegetative cover, and during thunderstorm events can contribute high amounts of fine clays into the river.

Current conditions in the North Platte River basin include the consideration of Seminoe and Pathfinder reservoirs. These reservoirs provide important recreational opportunities and are protected for the game fisheries by a 2AB classification. Water quality in reservoirs is mostly driven be nutrients. Nutrients can cause Algal blooms that may lead to eutrophication and anaerobic (no available oxygen) conditions. Some metals are more likely to go into the dissolved state when oxygen in lacking, and therefore it is important to monitor the accumulation of nutrients in reservoirs. In general the annual emptying of these reservoirs in response to irrigation demands downstream allow for enough circulation to prevent euthrophic conditions. The most common source for nutrients is large confined animal operations such as feedlots and municipalities. There are no feedlots in the analysis area and a limited amount of municipal systems upstream.

Great Divide Basin Including Separation Creek

Most streams and creeks in the Great Divide Basin are dominated by groundwater and only contain surface water during spring snowmelt and storm events. In general, the Total Dissolved Solids (TDS or Salinity) are high with low flows and the Suspended Sediment concentrations are high with high flows. TDS is particularly high for Separation Creek, the highest value measured was 1970 mg/L and the average 860 mg/L. For comparison the highest value measured for TDS at the North Platte site was 463 mg/L and the average was 274 mg/L. Total Suspended Solids (TSS) were also relatively high with the highest value recorded being 2460 mg/L.

4) Reference Conditions:

Reference conditions are taken from the historic accounts by Col. John Charles Fremont from *The Life of col. John Charles Fremont, and his narrative of exploration and adventures, in Kansas, Nebraska, Oregon and California*. His narrative includes portions of the North Platte and Sweetwater River as traveled in July and August of 1842. There is no mention of fish, however he did not note that there weren't fish present. Fremont estimates the width of the North Platte to be 70 yards (210 ft) in one location, probably below or under Pathfinder Reservoir. He also described islands and most likely the channel was braided indicating sediment deposition. The USGS Gage at Orin, Wyoming has an average width of 284 ft and is located at least 100 miles downstream and in the backwater from Glendo Reservoir. Most of this stretch Fremont says is 200- 300 ft. wide. The year Fremont traveled was during a drought according to the Indians in the area and grass was sparse.

Fremont gives a description of the Sweetwater River on 31st of July. He says that it was about 30 feet wide, 18 inches deep and moderate current. A rough estimate of the discharge assuming a 1 ft./s velocity is 45 cfs. The average measurements at the USGS Gage near Alcova records the smallest width of 24 ft on 8/30/99 and a discharge of 42 cfs. The highest flow in July and August was 141 cfs on 7/24/86. Again, there is no mention of the presence or absence of fish. Since Fremont traveled in a drought year it can be inferred that the Sweetwater was similar in geomorphology to what it is today.

As Fremont travels up the Sweetwater, he notes the saline conditions of the soil and the lack of vegetation in the uplands and river sections with willows and bright flowers near the creek. He also comes across several bands of buffalo. After several days of rain the party observes a flood

event with depths of 4 –5 feet and 60 feet across with a strong current. As he moves up into the foothills he notes the presence of aspen, beech and willow and the remnants of beaver dams.

Clarence King described the Red Desert portion of the Great Divide Basin in a *Geological Exploration of the Fortieth Parallel in 1869*, he says of this area:

"This region, and that to the north of the railroad between Washakie Station and Bitter Creek Ridges, constitutes the Red Desert, from which the railroad station takes its name. The northern portion is an almost unknown region, barren of vegetation, and almost without water, but said to contain several alkaline ponds."

5) Synthesis and Interpretation:

Within the assessment area, water quality impairment has not been identified in any water bodies by the State of Wyoming by listing them on the State's 303d list. There are indications that water quality parameters may exceed state standards in some areas. These events are difficult to predict and in many cases are part of natural processes. Livestock grazing, road density and other human practices contribute to non-point pollution. These human influenced processes may be additive to natural processes that lead to exceedences, however separating human from natural sources is difficult at best. Managing livestock and evaluating road designs on a project and allotment basis is the best way to address human contributions and can be measured and evaluated on a case-by-case basis or in monitoring vegetation health.

There are a number of wellhead protection areas in the analysis area that are designed to protect shallow surface waters near the well or spring sites. In general, good grazing management, evaluation of wetlands in these protected areas, and in some cases limiting oil and gas development in these areas are the management approach used by the BLM. Watershed, riparian/wetland habitat, and upland vegetation (Standards 1-3) are the tools used to evaluate upland areas that may contribute to water quality impacts. If an allotment fails on one of these standards it may also fail Standard 5 for water quality.

<u>Non-Point Pollution Sources</u>

Livestock and wild horses can contribute to vegetation disturbances altering the developed soil profile by degrading protective vegetation, root channels, and the structure of the soil horizons. This disturbance reduces infiltration and increases runoff. Disturbances also disrupt the biological and chemical processes that contribute to soil fertility. Such disturbances expose soil materials to both wind and water erosion.

Soil compaction increases water runoff and thereby promotes sheet, rill and gully erosion on site and stream down cutting and gullying off site. The greatest compaction occurs when soils are moist or wet. Compacted soils are less accommodating to plant roots, and seed germination is difficult in such soils. This physically reduces soil productivity. Increases in water runoff increase peak flows in perennial and ephemeral drainages. Increased flows can upset stream equilibrium, causing streams to downcut and ephemeral tributaries and other drainages to gully. Water tables may drop, reducing moisture available for plant growth. When this happens, riparian areas become degraded.

Disturbance in or adjacent to riparian areas can increase sediment into channels and degrade water quality. The PFC analysis method is design to evaluate if a given riparian or wetland

system is sustainable during a typical disturbance such as flooding. Therefore, if a stream channel is not meeting PFC, it is an indication that the system will contribute to water quality problems by eroding during a storm event. Riparian and wetland systems can also be an effective buffer and trap suspended sediment during storm events, therefore if they are degraded the quality of the water downstream will generally be lower than if the system was healthy. Therefore, if allotments have areas that fail PFC it can be assumed to contribute to non-point pollution in downstream water bodies.

Point Source Pollution

Point sources of pollution are regulated by the State of Wyoming using the National Pollutant Discharge Elimination System (NPDES) Program. Industrial and municipal sources are generally a small factor due to the low population density. The development of natural gas from coal seams, however is mostly on Federal Leases and in many cases on BLM administered land. Coalbed Methane (CBM) removes water from coal seams saturated with natural gas. As the water is removed the hydrostatic pressure of the coal seam is reduced and the natural gas travels to the well casing via fractures in the coal produced in the drilling process. This water is generally of good quality with TDS values of 1000-2000 mg/L in this area. The water can include trace elements and metals that would not be present in the same concentrations in other sources of water, such as selenium, manganese and iron. However, regardless of the water quality, the release of this water into systems that are adapted to current climate conditions, in itself, may cause erosion and lead to increased sediment loads as the channel adjusted to different flow conditions.

CBM discharges in the Great Divide Basin are generally not of concern for water quality in the produced water itself. However, there is the potential of creating erosion problems, changing the availability of water sources for livestock and/or wildlife and therefore their resource use, or by temporally changing the physical hydrology of a drainage. This is because high TDS values are common in the great divide (Current Conditions Section).

Sub-Analysis Area Comparison and Summary

The Sweetwater and North Platte River Systems generally have higher water quality classifications than the Great Divide Basin. There is no reason to assume that current water quality conditions for beneficial use are different from reference conditions, with the exception of the reservoirs on the North Platte and the development of water resources in the uplands. Impacts from these water developments in general store more sediment in the headwaters were the reservoirs are located and produce localized changes in water quality, such as reducing the temperature of streams below major reservoir outfalls and reducing peak flows. This may actually improve water quality for the game fish, one of the beneficial uses designated.

Non-point impacts to water quality from increased road density and ungulate grazing need to be managed through good engineering designs and minimized when possible by good grazing management. Point sources could contribute to increased sediment and salt loading and potentially introduce trace elements and metals to systems downstream. These point source activities should be well planned when the BLM is involved and the impacts minimized, since each CBM project will be evaluated through the NEPA process.

6) Recommendations:

Within the assessment area, water quality impairment has not been identified by the State of Wyoming for any of the Great Divide Basin or the North Platte River drainage. The BLM will continue to implement or refine BMPs for livestock grazing, which promote perennial vegetation to stabilize stream banks and improve cover and litter on uplands. Season and duration of use are the principal factors in considering management changes to address this standard.

Identify and correct existing road problems that alter surface water flows and result in accelerated erosion. Incorporate measures into new projects and environmental assessments, which will mitigate alterations to surface water flows.

The numbers of wild horses in the assessment area must be maintained at AML.

Promote mixed-age shrub and woodland communities with higher proportions of young and middle-aged stands, which have greater amounts of herbaceous cover to reduce runoff and soil erosion and increase infiltration and ground water recharge.

Design and plan surface discharge facilities for CBM to reduce impacts on water quality, and minimize road development through transportation plans.